Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1.(currently amended) A current-perpendicular-to-plane (CPP) giant magnetoresistive (GMR) magnetic field sensor of the synthetic spin valve type ~~having improved GMR and magnetorestriction qualities~~ comprising:

a substrate;

a seed layer formed on the substrate;

an antiferromagnetic pinning layer formed on the seed layer;

a synthetic antiferromagnetic pinned layer formed on the pinning layer, said pinned layer further comprising ferromagnetic layer AP2, formed on said pinning layer, a non-magnetic coupling layer formed on AP2 and ferromagnetic layer AP1 formed on said coupling layer;

<u>a spacer layer formed on said AP1 layer;</u>

a laminated free layer formed on <u>said spacer</u> layer ~~AP1 of the pinned layer~~, the free layer <u>including a plurality of layers of a second ferromagnetic material, each said layer being formed to a thickness between approximately 2.5 and 15 angstroms and each said layer being separated from an adjacent said layer by a lamina of a first ferromagnetic</u>

material formed to a thickness less than approximately 3 angstroms or by a Cu spacer layer formed to a thickness between approximately 1 and 4 angstroms; and wherein ~~including at least one~~ ~~ultra-thin~~ each said lamina of [[a]] said first ferromagnetic material ~~having~~ has a positive coefficient of magnetostriction and ~~at least one~~ each said layer of [[a]] said second ferromagnetic material ~~having~~ has a negative coefficient of magnetostriction, whereby the coefficient of magnetostriction of said free layer can be made positive or negative; and

a capping layer formed on said free layer.

2.(currently amended) The sensor of claim 1, wherein said first ferromagnetic material is any of the ferromagnetic ~~iron rich~~ alloys of the form ~~Co_xFe_{1-x}~~ Co_xFe_{100-x} with x between [[0.25]] 25 and [[0.75]] 75 and said second ferromagnetic material is $Co_{90}Fe_{10}$.

3.(canceled)

4. (currently amended) The sensor of claim 2 wherein said AP1 layer includes at least one layer of said first ferromagnetic material formed to a thickness between approximately 2.5 and 15 angstroms[[,]] and at least one layer of said second ferromagnetic material of thickness between approximately 2.5 and 15 angstroms.

Claims 4b-7 are canceled.

8.(original) The sensor of claim 1 wherein said free layer comprises:

a first layer of $Co_{90}Fe_{10}$;

a first lamina of $Fe_{50}Co_{50}$ formed on said first layer;

a second layer of $Co_{90}Fe_{10}$ formed on said first lamina;

a first spacer layer of Cu formed on said first lamina;

a third layer of $Co_{90}Fe_{10}$ formed on said first spacer layer;

a second lamina of $Fe_{50}Co_{50}$ formed on said second layer;

a fourth layer of $Co_{90}Fe_{10}$ formed on said second lamina;

a second spacer layer of Cu formed on said third layer;

a fifth layer of $Co_{90}Fe_{10}$ formed on said second spacer layer.

9.(original) The sensor of claim 8 wherein the thickness said first layer is between approximately 5 and 15 angstroms, the thickness of said second, third, fourth and fifth layers is between approximately 2.5 and 7.5 angstroms, the thickness of each lamina is less than approximately 3 angstroms and the thickness of each spacer layer is between approximately 1 and 4 angstroms.

10.(original) The sensor of claim 9 wherein the laminated configuration of the free layer produces a positive coefficient of magnetostriction.

11.(currently amended) The sensor of claim [[7]] 1 wherein said AP1 layer includes a lamination of bilayers, wherein each bilayer is a layer of $Fe_{50}Co_{50}$, of thickness between

approximately 7.5 and 15 angstroms, formed on a layer of Cu of thickness between approximately 1 and 4 angstroms.

12.(currently amended) A method of forming a current-perpendicular-to-plane (CPP) giant magnetoresistive (GMR) magnetic field sensor of the synthetic spin valve type having ~~improved GMR qualities and~~ a coefficient of magnetostriction that can be varied from positive to negative by changing a laminated configuration of its free layer comprising:

providing a substrate;

forming a seed layer on the substrate;

forming an antiferromagnetic pinning layer on the seed layer;

forming a synthetic antiferromagnetic pinned layer on the pinning layer, said formation further comprising forming ferromagnetic layer AP2 on said pinning layer, forming a non-magnetic coupling layer on AP2 and forming ferromagnetic layer AP1 on said coupling layer;

forming a spacer layer on said AP1 layer;

forming a laminated free layer on the ~~pinned~~ spacer layer, said laminated free layer including a plurality of layers of a second ferromagnetic material, each said layer being formed to a thickness between approximately 2.5 and 15 angstroms and each said layer being separated from an adjacent said layer by a lamina of a first ferromagnetic material formed to a thickness less than approximately 3 angstroms or by a Cu spacer layer formed to a thickness between approximately 1 and 4 angstroms; and wherein each ~~including at least one~~ ~~ultra-thin~~ lamina of [[a]] said first ferromagnetic material ~~having~~

has a positive coefficient of magnetostriction and ~~at least one~~ each layer of [[a]] said second ferromagnetic material ~~having~~ has a negative coefficient of magnetostriction, ~~wherein~~ whereby the number and arrangement of laminas of said first ferromagnetic material and the number and arrangement of layers of said second ferromagnetic material determine a coefficient of magnetostriction of the free layer having a value within a range from positive to negative; then

forming a capping layer ~~formed~~ on said free layer.

13.(currently amended) The method of claim 12, wherein said first ferromagnetic material is the ~~iron rich~~ ferromagnetic alloy of the form $\cancel{Co_xFe_{1-x}}$ Co_xFe_{100-x} with x between [[0.25]] 25 and [[0.75]] 75 and said second ferromagnetic material is $Co_{90}Fe_{10}$.

Claims14 – 19 are canceled

20.(original) The method of claim 12 wherein formation of said free layer comprises:

forming a first layer of $Co_{90}Fe_{10}$;

forming a first lamina of $Fe_{50}Co_{50}$ on said first layer;

forming a second layer of $Co_{90}Fe_{10}$ on said first lamina;

forming a first spacer layer of Cu on said first lamina;

forming a third layer of $Co_{90}Fe_{10}$ on said first spacer layer;

forming a second lamina of $Fe_{50}Co_{50}$ on said second layer;

forming a fourth layer of $Co_{90}Fe_{10}$ on said second lamina;

forming a second spacer layer of Cu on said third layer;

forming a fifth layer of $Co_{90}Fe_{10}$ on said second spacer layer.

21. (original) The method of claim 20 wherein the thickness said first layer is between approximately 5 and 15 angstroms, the thickness of said second, third, fourth and fifth layers is between approximately 2.5 and 7.5 angstroms, the thickness of each lamina is less than approximately 3 angstroms and the thickness of each spacer layer is between approximately 1 and 4 angstroms.

22.(original) The method of claim 12 wherein the laminated configuration of the free layer produces a positive coefficient of magnetostriction.

23.(currently amended) The ~~sensor~~ method of claim [[7]] 12 wherein said AP1 layer includes a lamination of bilayers, wherein each bilayer is a layer of $Fe_{50}Co_{50}$, of thickness between approximately 7.5 and 15 angstroms, formed on a layer of Cu of thickness between approximately 1 and 4 angstroms.